REMARKS

This application has been reviewed in light of the Office Action dated September 25, 2003. Claims 1-75 and 77 are presented for examination. Claims 1-3, 5, 6, 9-17, 20-27, 29, 30, 34-41, 44-51, 53, 54, 57-65, 68-75 have been amended to define more clearly what Applicant regards as his invention. Claim 77 has been added to provide Applicant with a more complete scope of protection. Claims 1, 14, 25, 38, 49, 62, and 77 are in independent form. Favorable reconsideration is requested.

Claims 1-75 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,933,535 (*Lee et al.*) in view of U.S. Patent No. 6,215,503 (*Snyder et al.*).

As shown above, Applicant has amended independent Claims 1, 14, 25, 38, 49, and 62 in terms that more clearly define what he regards as his invention. Applicant submits that these amended independent claims and new independent Claim 77, together with the remaining claims dependent thereon, are patentably distinct from the cited prior art for at least the following reasons.

The aspect of the present invention set forth in Claim 1 is a method of generating a pixel image. The image is formed by rendering and compositing at least a plurality of graphical objects, each object having a predetermined outline. The method divides a space in which the predetermined outlines are defined into a plurality of regions, each region being defined by at least one region outline substantially following at least one of the predetermined outlines or parts thereof. In particular, each region outline is formed by horizontal and vertical segments where the horizontal and vertical segments are selected from corresponding horizontal and vertical segments of a virtual grid encompassing the space such that at least one of the region

outlines comprises at least one concavity depending on the predetermined outlines. The virtual grid comprises a plurality of cells. Each cell comprises a plurality of pixels such that a spacing between the horizontal or vertical segments of the virtual grids is greater than that between adjacent pixels of a corresponding pixel grid. The region outlines are manipulated to determine a plurality of further regions. Each of the further regions is defined by corresponding ones of the selected horizontal and vertical segments of the virtual grid, where each further region has a corresponding compositing expression. The method classifies the further regions determined in the modification step according to at least one attribute of any one or more of the graphical objects which substantially fall within the further regions. Each corresponding compositing expression is modified according to a classification of each further region to form an optimized compositing expression for each further region compared to the corresponding compositing expression. The corresponding compositing expressions are optimized by eliminating one or more objects within the further regions from one or more of the corresponding expressions, depending on the classifications assigned in the classification step, while maintaining the image to be generated. Finally, the method comprises a generation step of generating the image by compositing the plurality of graphical objects using each of the compositing expressions optimized in the modification step.

Among the notable features of Claim 1 is that each region is defined by at least one region outline substantially following at least one of the predetermined outlines or parts thereof, and each region outline is formed by horizontal and vertical segments where the horizontal and vertical segments are selected from corresponding horizontal and vertical segments of a virtual grid encompassing the space such that at least one of the region outlines

comprises at least one concavity, depending on the predetermined outlines. Another notable feature of Claim 1 is that the virtual grid comprises a plurality of cells, and each cell comprises a plurality of pixels such that a spacing between the horizontal or vertical segments of the virtual grids is greater than that between adjacent pixels of a corresponding pixel grid. Still another notable feature of Claim 1 is that the region outlines are manipulated to determine a plurality of further regions, and each of the further regions is defined by corresponding ones of the selected horizontal and vertical segments of the virtual grid.

Lee et al. relates to processes for compressing video signals, and to an object-based digital video encoding process with error feedback. In making the rejection under Section 103 (a), the Examiner explicitly admits that *Lee et al.* fails to disclose a compositing expression for each region. Applicant concurs with this.

Applicant submits that *Lee et al.* fails to disclose or suggest the particular claimed feature that each region is defined by at least one region outline substantially following at least one of the predetermined outlines or parts thereof, each region outline being formed by horizontal and vertical segments, the horizontal and vertical segments being selected from corresponding horizontal and vertical segments of a virtual grid encompassing a space such that at least one of the region outlines comprises at least one concavity depending on the predetermined outlines. As depicted in Figure 22 of the present application, circles (901) and (902) have regions (913) and (914) that are aligned to the grid. The outlines of the regions (913) and (914) each have a number of concavities as a result of the region outlines following the outlines of the circles (901) and (902). Allowing the region outlines to have concavities allows

the region outlines to more closely follow the outlines of graphical objects such as the circles (913) and (914).[1]

In contrast, *Lee et al.* discloses that extrapolating objects or images to a rectangular pixel array configuration allows use of still image compression methods such as lattice or other wavelet compression or DCT (Column 22, lines 57-60). Accordingly, a rectangular extrapolation block boundary is defined about an object (Column 22, lines 65-67, and Fiure. 18A). Further, as seen in Figure 18A of *Lee et al.*, for example, the extrapolation block boundary (406) being rectangular, does not have any concavities and as a result does not substantially follow the outline corresponding to the object (402). The object (402) is anything but rectangular.

Accordingly, *Lee et al.* actually teaches away from the present invention as defined in independent Claim 1, where each region outline is formed by horizontal and vertical segments, the horizontal and vertical segments being selected from corresponding horizontal and vertical segments of a virtual grid encompassing the space such that at least one of the region outlines comprises at least one concavity depending on the predetermined outlines.

Applicant also submits that *Lee et al.* fails to disclose or suggest the particular claimed feature of the virtual grid comprising a plurality of cells, each cell comprising a plurality of pixels therewithin such that a spacing between adjacent horizontal or vertical segments of the virtual grid is greater than that between adjacent pixels of a corresponding pixel grid. For example, as seen in Figure 22 of the present specification, the grid (910) comprises cells.

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[1]It is to be understood, of course, that the claim scope is not limited by the details of the described embodiments, which are referred to only to facilitate explanation.

Further, as disclosed at page 16, lines 14-17, of the present specification, the typical segment size is chosen so that there is neither too much detail so that the region operations are overburdened, nor too much approximation to result in wasted compositing or insufficient optimization. For example, choosing a segment size of a distance between two adjacent pixels of an underlying pixel grid would result in too much detail so that the region operations are overburdened. Accordingly, each cell of the virtual grid comprises a plurality of pixels such that a spacing between adjacent horizontal or vertical segments of the virtual grid is greater than that between adjacent pixels of a corresponding pixel grid, as recited in Claim 1.

In contrast, as described above, *Lee et al.* discloses that horizontal lines of pixels within the extrapolation block boundary are scanned to identify horizontal lines with horizontal pixel segments having both zero and non-zero color component values (Column 23, lines 16-19). For example, the region (418), as seen in Figure 18B, represents horizontal pixel segments bounded at both ends by the perimeter of the object (418). As such, a spacing between adjacent horizontal or vertical segments of *Lee et al.* is the same as that between adjacent pixels of the underlying pixel grid of *Lee et al.* Accordingly, *Lee et al.* again teaches away from the present invention as defined by Claim 1, where a virtual grid comprising a plurality of cells is used, each cell of the virtual grid comprising a plurality of pixels therewithin such that a spacing between adjacent horizontal or vertical segments of the virtual grid is greater than that between adjacent pixels of a corresponding pixel grid.

Applicant further submits that *Lee et al.* fails to disclose or suggest the particular claimed feature of a manipulation step, of manipulating the region outlines to determine a plurality of further regions, each of the further regions being defined by

corresponding ones of the selected horizontal and vertical segments of the virtual grid. *Lee et al.* merely discloses that vertical lines of pixels within the extrapolation block boundary (406) are scanned to identify vertical lines with vertical pixel segments; and then determining a region (434) representing vertical pixel segments that have color component values of zero and are bounded at only one end by perimeter (408). However, the region (434) of *Lee et al.* is not determined based on a manipulation of previously determined regions. Further, the region (434) is not represented by corresponding ones of previously selected horizontal and vertical segments.

Applicant further submits that *Lee et al.* fails to disclose or suggest the particular claimed limitation of a modification step that modifies each corresponding compositing expression according to a classification of each further region to form an optimized compositing expression for each further region, since as noted above, the Examiner concedes that *Lee et al.* fails to disclose a compositing expression for each region (i.e., a corresponding compositing expression as claimed in Claim 1).

Snyder et al. discloses an image generator which takes graphical objects and an occlusion relationship for the objects and resolves non-binary occlusion cycles with image compositing operations to produce an output image of the objects.

Applicant submits that a combination of *Snyder et al.* and *Lee et al.* would fail to disclose or suggest the particular claimed feature that each region is defined by at least one region outline substantially following at least one of the predetermined outlines or parts thereof, each region outline being formed by horizontal and vertical segments, the horizontal and vertical segments being selected from corresponding horizontal and vertical segments of a virtual grid encompassing the space such that at least one of the region outlines comprises at least one

concavity depending on the predetermined outlines. Further, Applicant submits that a combination of *Snyder et al.* and *Lee et al.* would fail to disclose or suggest the particular claimed feature of the virtual grid comprising a plurality of cells, each cell comprising a plurality of pixels therewithin such that a spacing between adjacent horizontal or vertical segments of the virtual grid is greater than that between adjacent pixels of a corresponding pixel grid, as recited in Claim 1. Further, Applicant submits that a combination of *Snyder et al.* and *Lee et al.* would fail to disclose or suggest the particular claimed feature of a manipulation step, of manipulating the region outlines to determine a plurality of further regions, each of the further regions being defined by corresponding ones of the selected horizontal and vertical segments of the virtual grid. Still further, Applicant submits that a combination of *Snyder et al.* and *Lee et al.* would fail to disclose or suggest modifying each corresponding compositing expression according to a classification of each further region to form an optimized compositing expression for each further region.

A combination of *Lee et al.* and *Snyder et al.* would lead a skilled person to a method of compressing and decompressing digitized video signals in which a rectangular extrapolation block boundary is defined about an object. Such a method would then take the object and an occlusion relationship for the object and any other objects in the video signal and resolve non-binary occlusion cycles with image compositing operations to produce an output image of the objects. The method would then take an occlusion relationship for objects in a scene and a set of antialiazed image layers with transparency of the objects and produce an antialiazed image of the objects with hidden surfaces eliminated.

Accordingly, Applicant submits that independent Claim 1 is clearly patentable over the cited prior art. For similar reasons to those discussed above for independent Claim 1, Applicant also submits that independent Claims 25 and 49, and new Claim 77, which respectfully relate to an apparatus, computer program and further method corresponding essentially to Claim 1, are also in condition for allowance.

The aspect of the present invention set forth in Claim 14 is a method of generating an image. The image is formed by rendering and compositing at least a plurality of graphical objects, each object comprising a predetermined outline. The method divides a space in which the predetermined outlines are defined into a plurality of regions. Each region is defined by at least two region outlines substantially following at least one of the predetermined outlines or parts thereof. Each region outline is formed by horizontal and vertical segments. The horizontal and vertical segments are selected from corresponding horizontal and vertical segments of a virtual grid encompassing a space such that at least one of the region outlines comprises at least one concavity, depending on the predetermined outlines. One of the two region outlines for a particular object is arranged on either side of the predetermined outline for the particular object such that each object comprises three corresponding regions, wherein each region has a corresponding compositing expression. Further, the virtual grid comprises a plurality of cells, each cell comprising a plurality of pixels therewithin such that a spacing between adjacent horizontal or vertical segments of the virtual grid is greater than that between adjacent pixels of a corresponding pixel grid. The method further classifies the regions according to at least one attribute of any one or more of the graphical objects which substantially fall within the regions. Each corresponding compositing expression is modified according to a

classification of each region classified in the classification step to form an optimized compositing expression for each region compared to the corresponding compositing expression. The corresponding compositing expressions are optimized by eliminating one or more objects within the regions from one or more of the corresponding expressions, depending on the classifications, while maintaining the image to be generated. Finally, the image is generated by compositing the plurality of graphical objects using each of the compositing expressions optimized in the modification step.

Applicant submits that nothing has been found in *Snyder et al.* or *Lee et al.*, taken separately, or in any permissible combination, that teach or suggest the particular claimed features of Claim 14. In particular, nothing has been found in these references, taken separately or in combination that would teach each region outline being formed by horizontal and vertical segments, the horizontal and vertical segments being selected from corresponding horizontal and vertical segments of a virtual grid encompassing a space such that at least one of the region outlines comprises at least one concavity depending on the predetermined outlines. One of the two region outlines for a particular object being arranged on either side of the predetermined outline for the particular object such that each object comprises three corresponding regions, where each region has a corresponding compositing expression, and a virtual grid that comprises a plurality of cells, each cell comprising a plurality of pixels therewithin such that a spacing between adjacent horizontal or vertical segments of the virtual grid is greater than that between adjacent pixels of a corresponding pixel grid.

Accordingly, Applicant submits that independent Claim 14 is clearly patentable over the cited prior art. For similar reasons to those discussed above for independent Claim 14,

Applicant also submits that independent Claims 38 and 62, which respectfully recite an apparatus and a computer program corresponding to Claim 14, are also in condition for allowance.

The other rejected claims in this application depend from one or another of the independent claims discussed above, and, therefore, are submitted to be patentable for at least the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, individual reconsideration of the patentability of each claim on its own merits is respectfully requested.

This Amendment After Final Action is believed clearly to place this application in condition for allowance and, therefore, its entry is believed proper under 37 C.F.R. § 1.116. Accordingly, entry of this Amendment, as an earnest effort to advance prosecution and reduce the number of issues, is respectfully requested. Should the Examiner believe that issues remain outstanding, it is respectfully requested that the Examiner contact Applicant's undersigned attorney in an effort to resolve such issues and advance the case to issue.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

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